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DIMENSIONAL TOLERANCES FOR CARBON AND ALLOY CONSTRUCTIONAL STEEL

(First Revision)

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NEW DELHI 110002

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Indian Standard

DIMENSIONAL TOLERANCES FOR CARBON AND ALLOY CONSTRUCTIONAL STEEL

(First Revision)

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Indian Standard

DIMENSIONAL TOLERANCES FOR CARBON AND ALLOY CONSTRUCTIONAL STEEL

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 25 May 1987, after the draft finalized by the Alloy Steels and Special Steels Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1972. In this revision, the permissible deviation in size for hot-rolled flats, Grade 2, in Table 3 has been modified. A new column for 'Out of square' is introduced for Grade 1 and Grade 2 tolerances in hot-rolled round cornered squares in Table 4. A new sub-clause on tolerances on stainless and alloy steel slabs has also been added.

0.3 Rolling and cutting tolerances for hot-rolled structural steel products are coverd in IS : 1852-1979* but it does not cover tolerances for carbon and alloy constructional steels. It was, therefore, felt necessary to prepare a separate Indian Standard covering these requirements.

0.4 This standard covers the tolerances for hot-rolled carbon and alloy constructional steels keeping in view the manufacturing and trade practices followed in this country as well as in various other countries in this field.

0.4.1 Tolerances closer than those specified in this standard, if required for any particular end use, may be mutually agreed to between the purchaser and the manufacturer.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the

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*Rolling and cutting tolerances for hot-rolled steel products (*third revision*).

†Rules for rounding off numerical values (*revised*).

rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down dimensional tolerances for hot-rolled carbon and alloy constructional steels in the form of rounds, squares, hexagons, flats and billets.

1.2 This standard does not cover the tolerances for structural steels, spring steels and tool steels.

2. GRADES

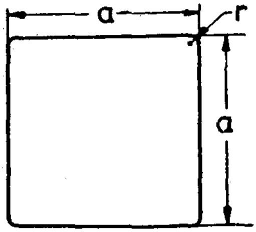
2.1 There shall be two grades of tolerances, namely, Grade 1 and Grade 2 (*see* **3.1.3**, and Tables 1, 2, 3 and 4).

3. SECTIONAL TOLERANCES

3.1 Round and Square Bars — Permissible deviation in size for hot-rolled round and square bars shall be as given in Table 1.

3.1.1 In the case of hot-rolled square bars, permissible corner radius (*see* Fig. 1) shall be as follows:

Nominal Size, a mm		*Permissible Corner Radius r, Max* mm
Over	To	
—	11	1
11	22	1·5
22	31	2
31	50	2·5
50	100	3
100	160	4
160	200	5



a = Nominal size
r = Corner radius

FIG. 1 CORNER RADIUS

3.1.2 In the case of square bars, the difference between the two diagonals shall not be more than 1·6 mm.

TABLE 1 PERMISSIBLE DEVIATION IN SIZE FOR HOT-ROLLED ROUND AND SQUARE BARS

(*Clauses* 2.1 *and* 3.1)

Nominal Size, mm		Tolerances, mm			
		Grade 1		Grade 2	
Over	Up to and Including	Permissible deviation	Out of round or out of square*	Permissible deviation	Out of round or out of square*
(1)	(2)	(3)	(4)	(5)	(6)
—	8	±0·13	0·2	±0·5	0·5
8	11	±0·15	0·24	±0·5	0·5
11	15	±0·18	0·25	±0·5	0·5
15	22	±0·20	0·3	±0·5	0·5
22	25	±0·24	0·35	±0·5	0·5
25	28	±0·25	0·4	±0·75	0.75
28	31	±0·28	0·45	±0·75	0·75
31	34	±0·30	0·5	±0·75	0·75
34	38	±0·36	0·6	±0·75	0·75
38	50	±0·40	0·6	±0·75	0·75
50	64	+0·8 −0	0·8	±1·0	1·0
64	80	+1·2 −0	0·8	±1·0	1·0
80	89	+1·2 −0	0·8	±1·25	1·25
89	100	+1·6 −0	1·2	±1·25	1·25
100	114	+1·6 −0	1·2	±1·50	1·50
114	125	+2·0 −0	1·5	±1·5	1·50
125	139	+2·0 −0	1·5	±2·0	2·0
139	160	+3·2 −0	2·0	±2·0	2·0
160	164	+3·2 −0	2·0	±2·5	2·5
164	200	+4·0 −0	2·5	±2·5	2·5

NOTE — Out of square is the difference in the two dimensions at the same cross-section of a square bar, each dimension being the distance between the opposite faces.

*Out of roundness is the difference between maximum and minimum diameters of the bars measured at the same cross-section.

3.1.3 In the case of coils of bar and rod dia size up to 25 mm, the permissible deviation shall be as follows:

Grade 1		Grade 2	
Permissible Deviation	Out of Round or Out of Square	Permissible Deviation	Out of Round or Out of Square
mm	mm	mm	mm
±0·4	0·5	±0·5	0·65

3.2 Hexagonal Bars — Permissible deviation in size for hot-rolled hexagonal bars shall be as given in Table 2.

NOTE — Permissible deviation in size for octagonal hot-rolled bars shall be same as hexagonal hot-rolled bars.

TABLE 2 PERMISSIBLE DEVIATION IN SIZE FOR HOT-ROLLED HEXAGONAL BARS

NOMINAL SIZE, mm		TOLERANCE, mm			
		Grade 1		Grade 2	
Over	Up to and Including	Permissible deviation	Out of hexagon*	Permissible deviation	Out of hexagon*
(1)	(2)	(3)	(4)	(5)	(6)
—	13	±0·18	0·3	±0·5	0·75
13	25	±0·25	0·4	±0·5	0·75
25	38	+0·6 −0·4	0·6	±0·8	1·2
38	50	+0·8 −0·4	0·8	±0·8	1·2
50	65	+1·2 −0·4	1·2	±1·6	2·4
65	85	+1·6 −0·4	1·6	±1·6	2·4

*Out of hexagon is the greatest difference between any two dimensions at the same cross-section between opposite faces.

3.3 Flats — Permissible deviation in size for hot-rolled flats shall be as given in Table 3.

3.4 Hot-Rolled Round Cornered Squares (RCS or Billets) — Permissible deviation in size shall be as given in Table 4.

TABLE 3 PERMISSIBLE DEVIATION IN SIZE FOR HOT-ROLLED FLATS

(*Clauses* 0.2 *and* 3.3)

NOMINAL SIZE, mm		TOLERANCE mm							
		Grade 1				Grade 2			
Over	Up to and Including	On Width	On Thickness			On Width	On Thickness		
			6 to 13 including	Over 13 to 25 including	Over 25 to 50 including		6 to 13 including	Over 13 to 25 including	Over 25 to 50 including
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
—	25	±0·4	±0·2	±0·25	±0·8	±1·0	±0·5	±0·8	±1·0
25	50	±0·8	±0·3	±0·4	±0·8	±1·0	±0·5	±0·8	±1·0
50	100	+1·5 −0·8	±0·4	±0·5	±0·8	±2·0	±0·5	±1·0	±1·5
100	150	+2·5 −1·5	±0·4	±0·5	±0·8	±3·0	—	±1·0	±2·0

TABLE 4 PERMISSIBLE DEVIATION IN HOT-ROLLED ROUND CORNERED SQUARES (BILLETS)

(*Clauses* 0.2 *and* 3.4)

NOMINAL SIZE mm		PERMISSIBLE DEVIATION mm		TOLERANCE FOR OUT OF SQUARE*, *Max* mm	
Over	Up to and Including	Grade 1	Grade 2	Grade 1	Grade 2
(1)	(2)	(3)	(4)	(5)	(6)
—	50	±0·6	±1·5	0·6	1·0
50	64	±1·2	±1·5	0·8	1·5
64	89	+1·8 −0	±1·5	1·3	1·5
89	100	+2·4 −0	±1·5	1·8	2·0
100	114	+2·4 −0	+4·5 −1·5	1·8	3·0
114	150	+3·0 −0	+6·0 −3·0	2·5	4·0

*Out of square is the difference in the two dimensions at the same cross-section of a square bar, each dimension being the distance between the opposite faces.

3.4.1 Unless otherwise specified, tolerance on weight per metre for hot-rolled round cornered squares (billets) shall be + 4 percent. No negative tolerance shall be permissible.

3.4.2 Tolerance of hot-rolled blooms up to 350 mm size shall be ±2·5 percent of the sizes (mm).

3.4.3 Permissible deviation on stainless and alloy steel as rolled slabs shall be as given in Table 5.

TABLE 5 PERMISSIBLE DEVIATION ON STAINLESS AND ALLOY STEEL AS ROLLED SLABS

	TOLERANCE ON THICKNESS (mm)	TOLERANCE ON WIDTH (mm)
For all sizes of slabs	+2 −4	+10 −0

4. TOLERANCE ON LENGTH

4.1 Bars — Bars shall be supplied in 3 to 6 m length or in multiples with maximum of 10 percent shorts down to 1 m. The bars may also be supplied as per the mutual agreement between the supplier and the purchaser.

4.2 Cutting and Shearing Tolerances — The tolerances shall not exceed the limits given below for materials ordered in exact lengths:

Nominal Size, mm	*Permissible Deviation*, mm
Up to 50	+ 75
Over 50	+150

5. STRAIGHTNESS TOLERANCES

5.1 The permissible deviation shall not exceed the following limits.

a) *Ordinary*	
1) Hot-bed straightened	6 mm in any 1·0 m length
2) Hot-rolled and machine straightened	3 mm in any 1·0 m length
b) *Specially Treated*	1·5 mm in any 1·0 m length

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